

CLAIMS:

What is claimed is:

1. 1. An apparatus comprising:
2. a combination digital signal and radio frequency connector for
3. directly coupling a motherboard to a radio frequency module board.
1. 2. The apparatus of Claim 1, further comprising a pin and receptacle
2. connection for a signal line in the radio frequency connector.
1. 3. The apparatus of Claim 2, wherein the receptacle comprises a sheet of
2. metal stamped and rolled into a tulip shape.
1. 4. The apparatus of Claim 1, further comprising a spring cage and barrel
2. connection surrounding the ground line.
1. 5. The apparatus of Claim 4, wherein the spring cage and barrel
2. comprise a sheet metal stamped and rolled into a substantially cylindrical
3. form.
1. 6. The apparatus of Claim 4, wherein the spring cage comprises finger
2. springs having flexural compliance that retains a close contact against an
3. inner surface of the barrel upon mating.
1. 7. An apparatus comprising:
2. a radio frequency board having a combination digital signal and radio
3. frequency connector adapted for directly coupling to a motherboard for a
4. computer.
1. 8. The apparatus of Claim 7, further comprising a pin and receptacle
2. connection for a signal line in the radio frequency connector.
1. 9. The apparatus of Claim 8, wherein the receptacle comprises a sheet of
2. metal stamped and rolled into a tulip shape.

1 10. The apparatus of Claim 7, further comprising a spring cage and barrel
2 connection surrounding the ground line.

1 11. The apparatus of Claim 10, wherein the spring cage and barrel
2 comprise a sheet of metal stamped and rolled into a substantially cylindrical
3 form.

1 12. The apparatus of Claim 10, wherein the spring cage comprises finger
2 springs having flexural compliance that retains a close contact against an
3 inner surface of the barrel upon mating.

1 13. An apparatus comprising:
2 a pin and receptacle connection for transferring a signal coupled
3 between a radio frequency module compatible with a mobile computer
4 motherboard and a motherboard in a mobile computer; and
5 a spring cage and barrel connection coupled around the pin and
6 receptacle connection for transferring ground, wherein the apparatus
7 comprises a radio frequency coaxial direct board to board connection.

1 14. The apparatus of Claim 13, wherein the receptacle comprises a sheet
2 metal stamped and rolled into a tulip shape.

1 15. The apparatus of Claim 13, wherein the receptacle and the spring cage
2 are made from at least one of phosphor bronze, beryllium copper and brass.

1 16. The apparatus of Claim 13, wherein the pin and barrel comprise a
2 copper alloy.

1 17. The apparatus of Claim 16, wherein copper alloy is plated to avoid
2 corroding.

1 18. The apparatus of Claim 13, wherein the spring cage and barrel
2 comprise a sheet metal stamped and rolled into a substantially cylindrical
3 form.

1 19. The apparatus of Claim 13, wherein the spring cage comprises finger
2 springs having flexural compliance that retains a close contact against an
3 inner surface of the barrel upon mating.

1 20. The apparatus of Claim 13, wherein the ground connection from the
2 spring cage and barrel are each coupled to a surface co-planar waveguide
3 ground on their respective boards.

1 21. The apparatus of Claim 20, wherein the co-planar waveguide
2 grounds are coupled to their respective printed circuit board ground planes
3 by vias in the boards.

1 22. An apparatus comprising:
2 a direct board to board coaxial connection having a male portion and
3 a female portion, wherein one of the male portion or female portion is
4 coupled to a computer motherboard and the other of the male portion or
5 female portion is coupled to a radio frequency module card such that the
6 radio frequency module card is removeably coupled to the computer
7 motherboard by the direct board to board coaxial connection.

1 23. The apparatus of Claim 22, wherein the coaxial connection comprises
2 a pin and receptacle connection for transferring the signal, and a spring cage
3 and barrel connection for transferring the ground.

1 24. The apparatus of Claim 23, wherein the spring cage and barrel
2 transfer the ground to a surface co-planar waveguide ground and then to
3 the ground planes of the boards through vias.

1 25. A method comprising:
2 forming a signal pin;
3 stamping a ground shield spring cage from a sheet of metal;
4 rolling the ground shield spring cage to form a cage with finger
5 springs for gripping the inside of a ground barrel;
6 stamping a ground barrel from a sheet of metal;

- 7 rolling the ground barrel into a cylinder;
- 8 stamping a signal pin receptacle from a sheet of metal;
- 9 rolling the signal pin receptacle to form a cylinder with a spring end
- 10 that resembles a tulip;
- 11 plating the pin and the barrel;
- 12 assembling the signal pin, ground spring cage, and a housing to form
- 13 a male coaxial connector by press interference fitting; and
- 14 assembling the signal pin receptacle, ground barrel and a housing to
- 15 form a female coaxial connector by press interference fitting.

26. The method of Claim 25, further comprising:
fabricating the ground shield spring cage and signal pin receptacle
from one of the group comprising phosphor bronze, beryllium copper, or
brass.

27. The method of Claim 26, further comprising:
fabricating the signal pin and outer ground shield from a copper
alloy.

28. A method comprising:

- aligning a radio frequency module board compatible with a computer motherboard with a computer motherboard; and
- connecting the radio frequency module board to the motherboard of a computer using direct board to board radio frequency coaxial connectors wherein the connectors comprise a signal pin, a signal pin receptacle, a ground shield spring cage and a ground shield barrel; and the signal pin receptacle, ground shield spring cage and ground shield barrel are fabricated from stamped sheets of metal.

29. The method of Claim 28, further comprising:
coupling the signal pin to the signal pin receptacle to form a signal
line connection between the radio frequency module board and the
computer motherboard.

- 1 30. The method of Claim 28, further comprising:
2 coupling the ground shield spring cage to the ground shield barrel to
3 form a ground shield connection for the signal line connection between the
4 radio frequency module board and the computer motherboard.

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